Claims

1. (Currently amended) A method of moving droplets, comprising:

    providing a liquid phase on a surface;

    dispensing a droplet into the liquid phase, the liquid phase being immiscible with the droplet; and

    directing ~~focusing~~ a focused beam of light ~~at an edge of~~ into direct contact with an edge region of the droplet in the liquid phase causing the droplet to heat and ~~to produce~~ a thermal gradient to form within the droplet sufficient to induce the droplet to move in the liquid phase.

2. (Original) The method of claim 1, wherein the droplet forms a contact angle approaching 180° with respect to the surface.

3. (Canceled)

4. (Canceled)

5. (Original) The method of claim 1, wherein the immiscible liquid phase includes an organic liquid.

6. (Original) The method of claim 5, wherein the organic liquid includes decanol.

7. (Original) The method of claim 1, wherein the immiscible liquid phase controls evaporation of the droplet.

8. (Original) The method of claim 1, wherein the immiscible liquid phase comprises a first immiscible liquid and a second immiscible liquid, the second immiscible liquid having a greater density than that of the first immiscible liquid and of the droplet to produce a fluid-to-fluid interface between the immiscible liquids upon which the droplet sits.

9. (Original) The method of claim 8, wherein the second immiscible liquid includes perflourinated silicone oil.

10. (Canceled)

11. (Canceled)

12. (Original) The method of claim 1, wherein the droplet is aqueous.

13. (Original) The method of claim 1, wherein the beam of light includes an infrared wavelength.

14. (Original) The method of claim 1, further comprising inserting dye into one of the droplet and the immiscible liquid phase to cause optical absorption by molecules of the dye.

15. (Original) The method of claim 1, wherein a size of the droplet ranges from approximately 30 µm to 1500 µm in diameter.

16. (Original) The method of claim 1, wherein the droplet is a first droplet, and further comprising depositing a second droplet into the immiscible liquid phase and moving the first droplet into the second droplet to cause the droplets to fuse and contents of the droplets to mix.

17. (Original) The method of claim 16, wherein each droplet contains a chemical fragment.

18. (Original) The method of claim 16, further comprising detecting a biological molecule in the fused droplet.

19. (Original) The method of claim 16, further comprising detecting a gene in the fused droplet.

20. (Original) The method of claim 16, further comprising detecting products of gene expression of a particular gene.

21. (Original) The method of claim 1, further comprising turning the light beam on and off to perform thermal cycling of the droplet.

22. (Currently amended) An apparatus for moving droplets, comprising:

a liquid phase on a surface;

a droplet disposed in the liquid phase ~~on the surface~~;

a light source producing a focused beam of light;

means for directing the focused beam of light ~~at~~ into direct contact with an edge region of the droplet disposed in the liquid phase ~~on the surface~~ causing the droplet to heat ~~the droplet~~ and ~~cause~~ a thermal gradient to form ~~across~~ within the droplet sufficient to induce the droplet to move ~~across the surface~~ within the liquid phase.

23. (Currently amended) The apparatus of claim 22, ~~further comprising a liquid phase on the surface,~~ wherein the liquid phase ~~being~~ is immiscible with the droplet, and wherein the droplet is surrounded by the immiscible liquid phase.

24. (Currently amended) The apparatus of claim 22 ~~23~~, wherein the ~~immiscible~~ liquid phase comprises a first immiscible liquid and a second immiscible liquid, the second immiscible liquid having a greater density than that of the first immiscible liquid and of the droplet to produce a fluid-to-fluid interface between the immiscible liquids upon which the droplet sits.

25. (Original) The apparatus of claim 24, wherein the second immiscible liquid includes perflourinated silicone oil.

26. (Original) The apparatus of claim 23, wherein the immiscible liquid phase includes an organic liquid.

27. (Original) The apparatus of claim 26, wherein the organic liquid includes decanol.

28. (Original) The apparatus of claim 22, where the beam of light includes an infrared wavelength.

29. (Original) The apparatus of claim 22, wherein the droplet is aqueous.

30. (Original) The apparatus of claim 22, wherein the droplet includes a dye to cause optical absorption by the droplet.

31. (Original) The apparatus of claim 22, wherein a size of the droplet ranges from approximately 30 µm to 1500 µm in diameter.

32. (Currently amended) The apparatus of claim 22, further comprising a second droplet ~~on the surface~~ disposed in the liquid phase and wherein the directing means causes one of the droplets to move into the other of the droplets, causing the droplets to fuse and contents of the droplets to mix.

33. (Original) The apparatus of claim 32, wherein each droplet contains a chemical fragment.

34. (Original) The apparatus of claim 32, further comprising means for detecting a biological molecule in the fused droplet.

35. (Original) The apparatus of claim 32, further comprising means for detecting a gene in the fused droplet.

36. (Currently amended) The apparatus of claim 32, further comprising means for detecting ~~produces~~ products of gene expression of a particular gene.

37. (New) The method of claim 1, wherein the surface is a surface of a substrate upon which the liquid phase is disposed, the substrate being transparent to a wavelength of the light beam so that the light beam passes through the substrate to come in direct contact with the droplet.

38. (New) The apparatus of claim 22, wherein the surface is a surface of a substrate upon which the liquid phase is disposed, the substrate being transparent to a wavelength of the light beam so that the light beam passes through the substrate to come in direct contact with the droplet.